

WHAT IS CLAIMED IS:

1. In a data processing system that executes a program of instructions, a method of inverting a distorted surface in a detail-in-context presentation comprising the steps of:

- a) locating a first approximation point P_i for the inversion of a point X;
- b) determining if said approximation point P_i is acceptable as an inversion of said point X;
- c) locating a next approximation point P_{i+1} for the inversion of said point X if said approximation point P_i is not acceptable as an inversion of said point X;
- d) repeating steps (b) and (c) until an acceptable point is located for the inversion of said point X.

2. The method of claim 1 wherein said point X is a point on said distorted surface in said detail-in-context presentation whose inversion is sought.

3. The method of claim 1 wherein said point P_i is a point on said undistorted surface and is the approximate inversion point of said point X.

4. The method of claim 3 wherein said undistorted surface is included in said detail-in-context presentation.

5. The method of claim 1, step (a), and further comprising the step of drawing a line RVP-X from a point RVP above an undistorted surface in said detail-in-context presentation, through said point X, and through said undistorted surface to locate said

first approximation point P_i at the point of intersection of said line RVP-X and said undistorted surface.

6. The method of claim 5 wherein said point RVP is a reference viewpoint for said detail-in-context presentation.

7. The method of claim 1, step (b), and further comprising the steps of:

a) obtaining a point P_i^D by displacing said point P_i onto said distorted surface by the application of a distortion function D ;

b) calculating the magnitude of the difference between said point X and said point P_i^D , where said magnitude of the difference is given by $|P_i^D - X|$;

c) deciding that an acceptable value of said point P_i for the inversion of said point X has been obtained if said magnitude of the difference is less than a tolerance δ .

8. The method of claim 1, step (c), and further comprising the steps of:

a) projecting said point P_i^D onto said line RVP-X to locate a point P_i^P , where said point P_i^P is the closest point to said point P_i^D on said line RVP-X;

b) projecting said point P_i^P onto said undistorted surface in a direction opposite to that of the displacement due to the distortion to locate said next approximation point P_{i+1} for the inversion of said point X , where said displacement due to distortion is given by a line $F_0 - F$ drawn through said undistorted surface and the focus F of said distorted surface, and hence where said point P_{i+1} is located on said undistorted surface at the point of

intersection of said undistorted surface and a line drawn parallel to said line $F_0 - F$ and passing through said point P_i^P .

9. The method of claim 1 and further comprising the step of bisecting said point P_i to counter divergence in successive approximations of said point P_i due to folds or discontinuities in said distorted surface.

10. The method of claim 1 and further comprising the step of repeating steps (a) through (d) for additional or remaining points in said distorted surface.

11. The method of claim 7 and further comprising the step of selecting a value for said tolerance δ .

12. The method of claim 11 wherein said tolerance δ is selected as a fraction of the width of a pixel for a computer display surface.

13. The method of claim 12 wherein said fraction is one half.

14. The method of claim 1 wherein said undistorted surface is a basal plane in accordance with Elastic Presentation Space graphics technology.

15. The method of claim 7 wherein said distortion function D is used to generate said distorted surface.

16. The method of claim 15 wherein said distortion function D is an n -dimensional function, where n is an integer greater than zero.

17. The method of claim 16 wherein said distortion function D is a three-dimensional function.

18. The method of claim 15 wherein said distortion function D is a lens function.

19. The method of claim 1 wherein said detail-in-context presentation is generated in accordance with Elastic Presentation Space graphics technology.

20. The use of the method of claim 1 to obtain the distance between points on said undistorted surface from the relative distances between corresponding points on a plurality of said distorted surfaces in said detail-in-context presentation.

21. A data processing system for the inversion of detail-in-context presentations including an input device, a central processing unit, memory, and a display wherein said data processing system has stored therein data representing sequences of instructions which when executed cause the method and use of claims 1 through 20 to be performed.